Routine Renal Imaging after ^{99m}Tc-Glucoheptonate Brain Scans

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Immediately after brain scanning with ^{99m}Tc-glucoheptonate, the kidneys were imaged in 200 prospectively studied cases. Abnormalities were found in 22 cases (11%); they included renal metastases, renal cysts, and kidney displacement or obstruction by masses. In five instances, significant previously unknown abnormalities were found. The renal contours were usually better seen than on intravenous urograms or bone scans. Most kidney studies could be completed in less than 2 min, making renal imaging worthwhile as a low-cost high-yield routine addition to brain scanning.

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Technetium-99m-glucoheptonate is a useful agent for brain scanning (*1*). Since it was originally developed for renal imaging (*2*), the possibility of expanding the screening value of the brain scan at negligible cost was suggested. In a prospective study of 200 consecutive brain scans with ^{99m}Tc-glucoheptonate, renal imaging was also performed.

MATERIALS AND METHODS

Technetium-99m-glucoheptonate, prepared from a commercial kit (New England Nuclear Corp., North Billerica, Mass.), was injected as an intravenous bolus in a normalized dose of 10 mCi per square meter of body surface area. An Ohio-Nuclear scintillation camera with a high-resolution low-energy parallel-hole collimator was employed, using a 20% technetium window. The images were recorded on 70-mm film. After the delayed static brain image, a single 500,000-count posterior view of the renal area was obtained. This image was usually recorded about 2⅓ hr after injection of the radiopharmaceutical. If an abnormality was noted, additional oblique, lateral, and magnified pinhole views were ordered by the physician reviewing the scan. The renal study was interpreted along with pertinent radiographs.

RESULTS

The patients ranged in age from 6 months to 82 years. Satisfactory kidney images were obtained in all 200 cases, including several with severe azotemia (serum creatinine levels up to 11 mg%). The time required to collect 500,000 counts varied over 52–307 sec, with a median of 95 sec. Uptake in renal tubular tissue was clearly defined. The upper collecting system was usually free of radionuclide, except in patients who were dehydrated or who had caliectasis, obstruction, or renal insufficiency. The contours and positions of the kidneys could be easily identified. In many instances, visualization was superior to the contour delineation on the intravenous pyelogram, although the latter often included zonograms or tomograms obtained several minutes after injection.

Abnormalities were noted in 22 cases (11%), outlined in Table 1. While some were already known to the clinician, they included two instances of unsuspected renal metastases, one case of kidney displacement by a previously undiagnosed mass, two cases of unrecognized unilateral ureteral obstruction, and three incidental renal cysts.

By coincidence, there were also 22 abnormal brain scans among these 200 patients. Four were judged to

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TABLE 1. ABNORMALITIES DETECTED ON RENAL VIEWS ACCOMPANYING 200 BRAIN SCANS

Abnormality	Previously unsuspected	Known	Total
Metastases to kidney	2	0	2
Renal displacement by mass	1	1	2
Renal obstruction by tumor	2	1	3
Renal cyst	3	0	3
Renal tumor	0	1	1
Absent kidney	0	2	2
Renal scarring or atrophy	3	1	4
Horseshoe kidney	0	1	1
Renal failure	0	4	4
Total	11	11	22

be primary brain tumors, five were considered cerebral metastases, eight were thought to be vascular lesions, one was traumatic, and four were uncertain. In only four cases (2%) were both the brain and kidney images abnormal.

DISCUSSION

Imaging the kidneys in the same study with the brain scan is comparable to the postangiographic pyelogram (*3*), which is routinely employed in many neuroradiology departments. Not only do neoplasms, vascular diseases, and trauma often involve both regions, but a number of other syndromes select both the brain and kidneys. For instance, there are associations between cerebral aneurysms and polycystic kidneys, between cerebral hamartomas and renal angiomyolipomas (Sturge–Weber syndrome), and between cerebral hemangiomas and renal carcinomas (Von Hippel–Lindau disease).

Renal imaging might also be valuable in conjunction with bone scanning (*4–6*). However, kidney images obtained with ^{99m}Tc-glucoheptonate contain more detail than those seen with ^{99m}Tc-phosphates. One should not rely on a normal renal image in a bone scan to exclude kidney disease. In one instance, metastases easily seen on the renal associate of the brain scan could not be discerned even retrospectively in a bone scan made several days later.

In our small study, the kidney views detected as many abnormalities as the brain scans. In five instances, significant but previously undiagnosed extensions of the disease processes were found. We recommend that a view of the kidneys be a routine part of a brain scan whenever ^{99m}Tc-glucoheptonate or another agent with a similar excretion pattern is employed.

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